Dual Discriminator Generative Adversarial Network for Video Anomaly Detection

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Abstract

Video anomaly detection is an essential task because of its numerous applications in various areas. Because of the rarity of abnormal events and the complicated characteristic of videos, video anomaly detection is challenging and has been studied for a long time. In this paper, we propose a semi-supervised approach with a dual discriminator-based generative adversarial network structure. Our method considers more motion information in video clips compared with previous approaches. Specifically, in the training phase, we predict future frames for normal events via a generator and attempt to force the predicted frames to be similar to their ground truths. In addition, we utilize both a frame discriminator and motion discriminator to adverse the generator to generate more realistic and consecutive frames. The frame discriminator attempts to determine whether the input frames are generated or original frames sampled from the normal video. The motion discriminator attempts to determine whether the given optical flows are real or fake. Fake optical flows are estimated from generated frames and adjacent frames, and real optical flows are estimated from the real frames sampled from original videos. Then, in the testing phase, we evaluate the quality of predicted frames to obtain the regular score, and we consider those frames with lower prediction qualities as abnormal frames. The results of experiments on three publicly available datasets demonstrate the effectiveness of our proposed method.